FIG. 1

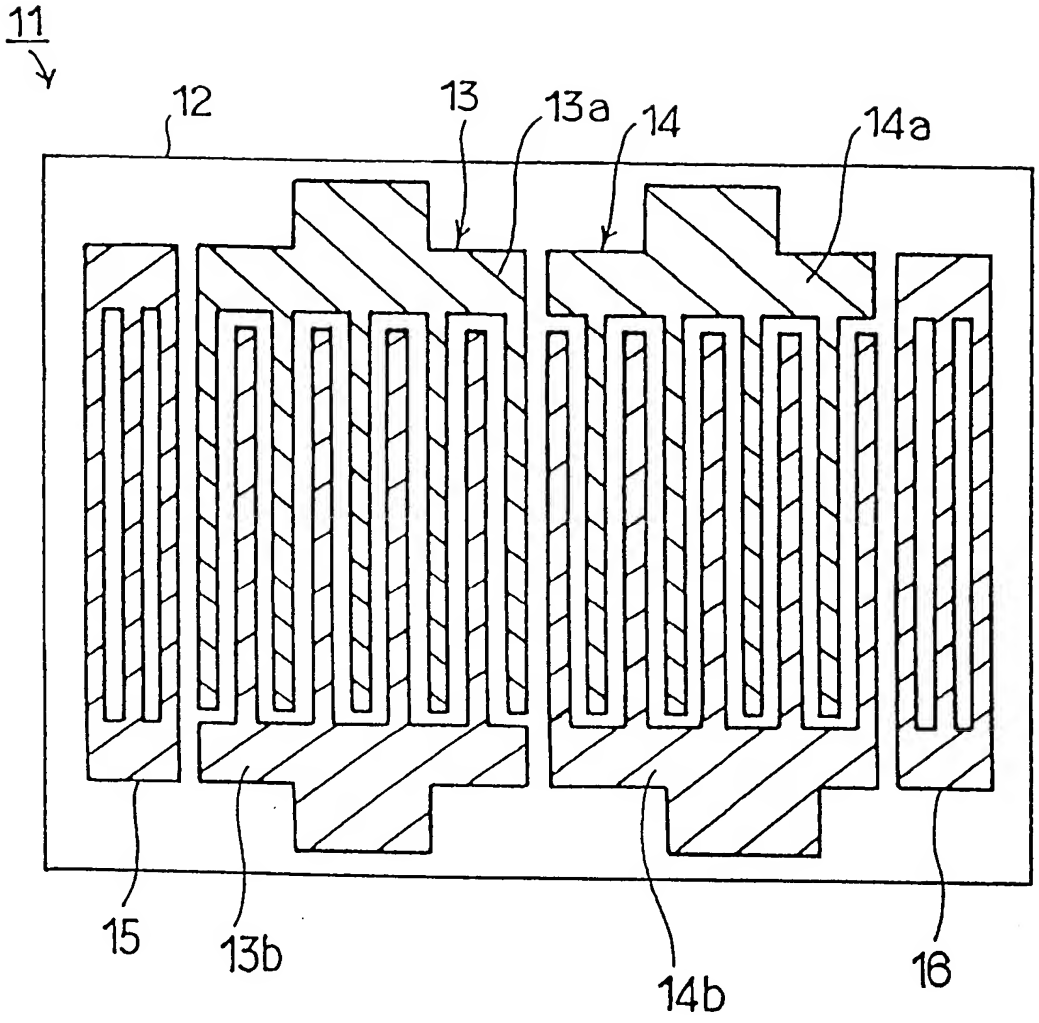


FIG. 2A

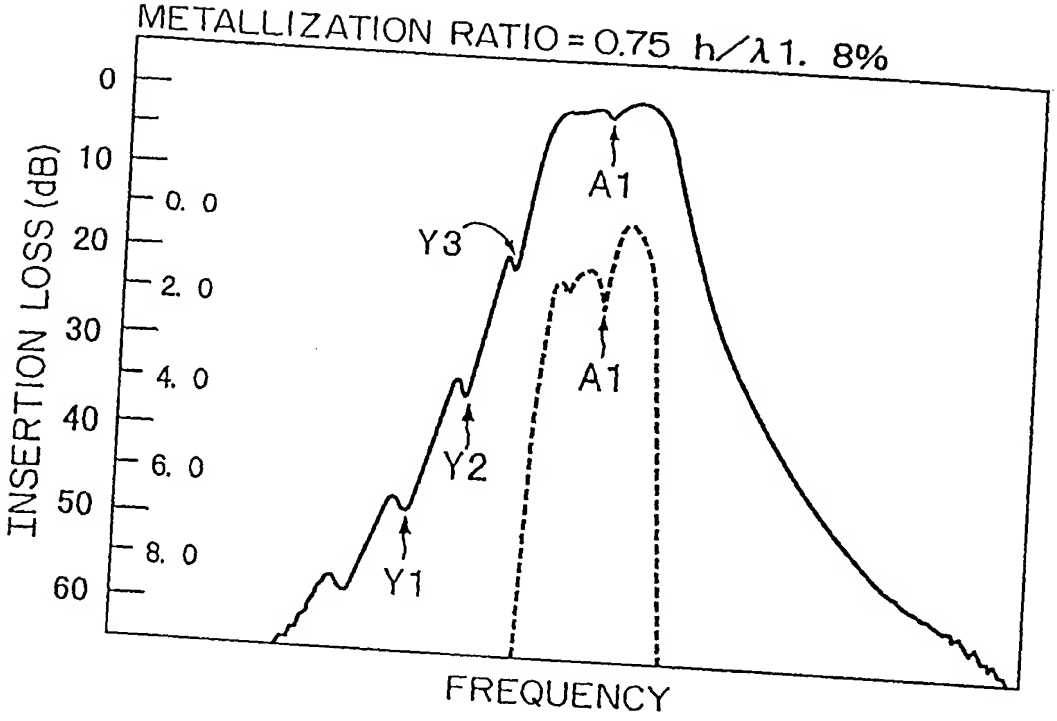

METALLIZATION RATIO = 0.75 h/λ 1. 8%
INSERTION LOSS (dB)
0
10
20
30
40
50
60
0. 0
2. 0
4. 0
6. 0
8. 0
A1
A1
Y3
Y2
Y1
FREQUENCY

FIG. 2B

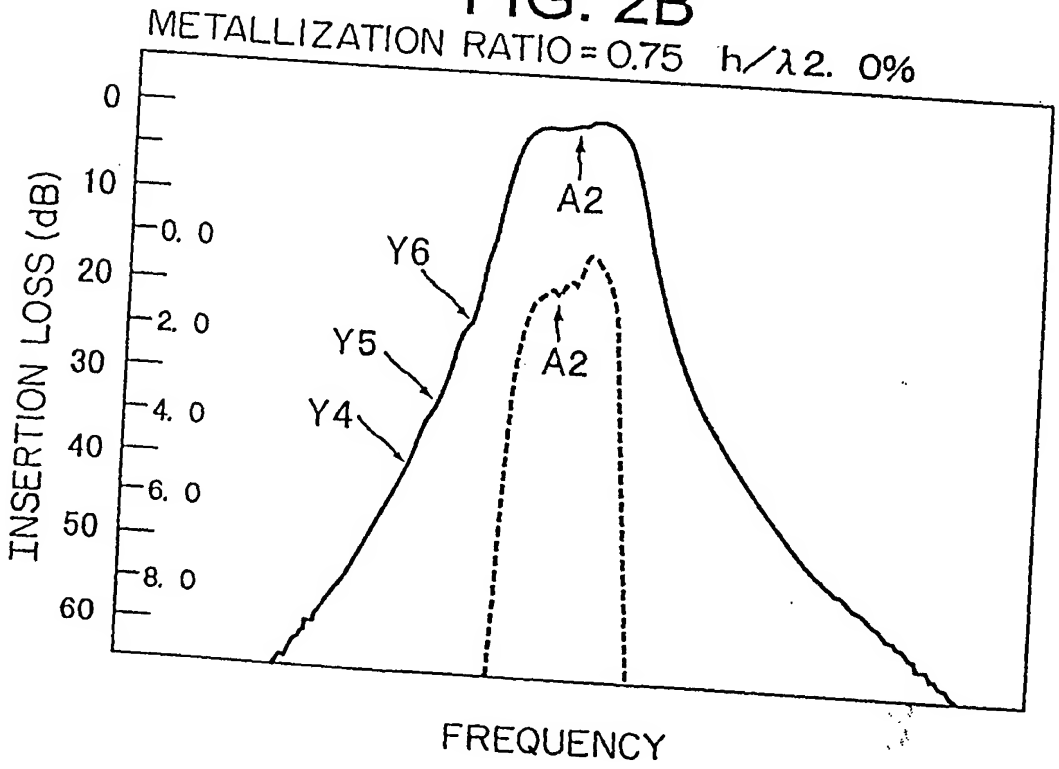

METALLIZATION RATIO = 0.75 h/λ 2. 0%
INSERTION LOSS (dB)
0
10
20
30
40
50
60
0. 0
2. 0
4. 0
6. 0
8. 0
A2
A2
Y6
Y5
Y4
FREQUENCY

FIG. 3A

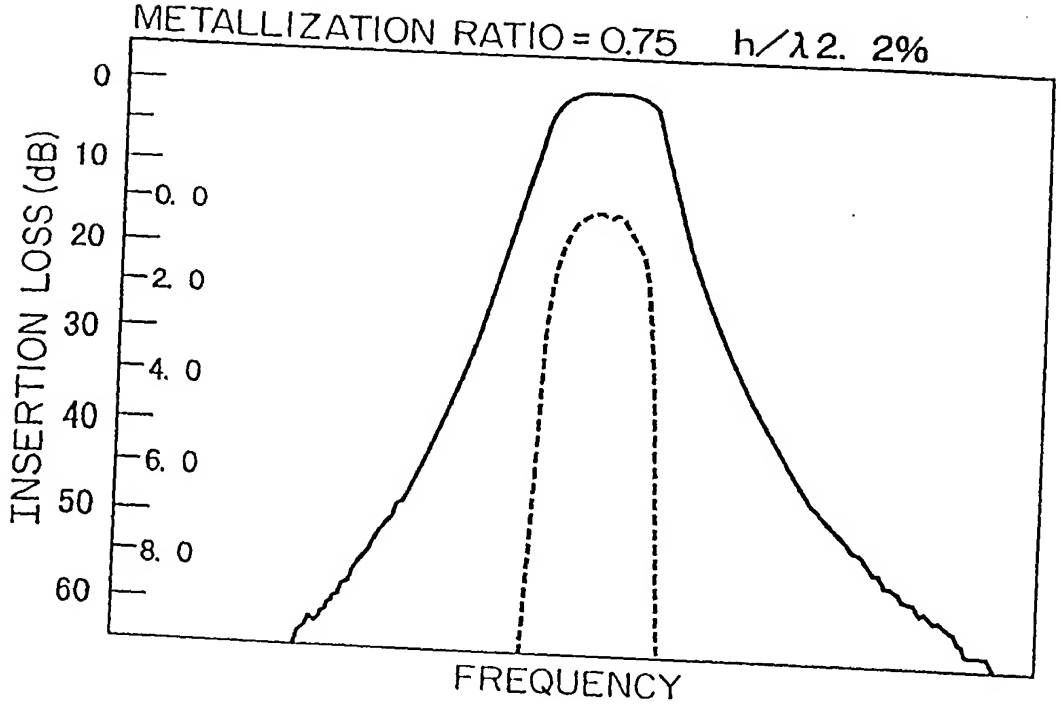

METALLIZATION RATIO = 0.75 h/λ 2. 2%
INSERTION LOSS (dB)
0
10
20
30
40
50
60
0. 0
2. 0
4. 0
6. 0
8. 0
FREQUENCY

FIG. 3B

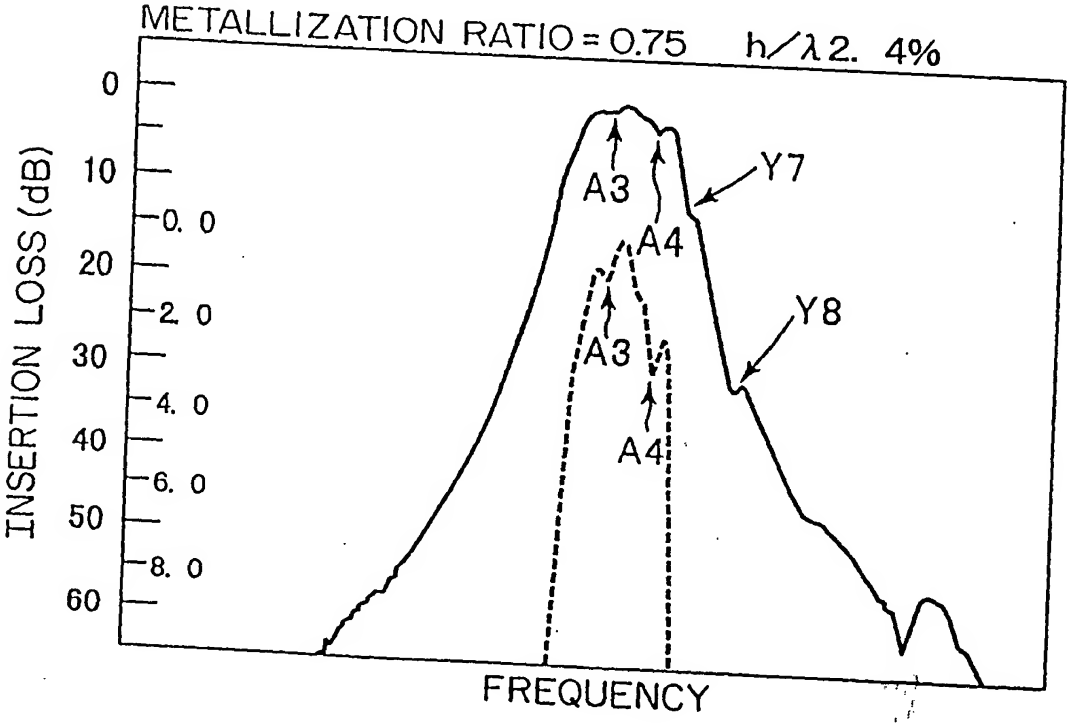

METALLIZATION RATIO = 0.75 h/λ 2. 4%
INSERTION LOSS (dB)
0
10
20
30
40
50
60
0. 0
2. 0
4. 0
6. 0
8. 0
A3
A4
Y7
A3
A4
Y8
FREQUENCY

FIG. 4

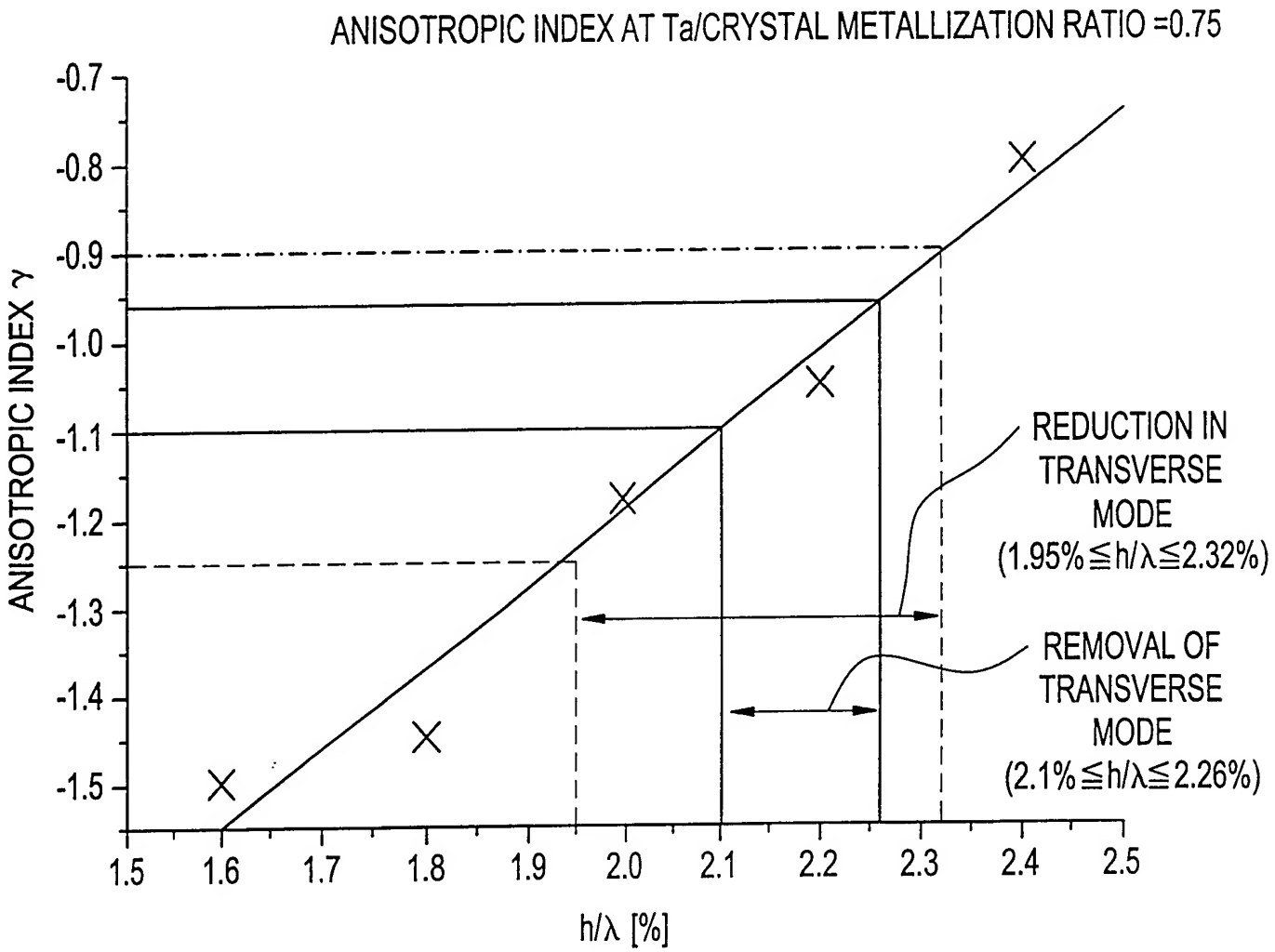

ANISOTROPIC INDEX AT Ta/CRYSTAL METALLIZATION RATIO =0.75
ANISOTROPIC INDEX γ
-0.7
-0.8
-0.9
-1.0
-1.1
-1.2
-1.3
-1.4
-1.5
1.5
1.6
1.7
1.8
1.9
2.0
2.1
2.2
2.3
2.4
2.5
h/λ [%]
REDUCTION IN TRANSVERSE MODE (1.95%≦h/λ≦2.32%)
REMOVAL OF TRANSVERSE MODE (2.1%≦h/λ≦2.26%)

FIG. 5

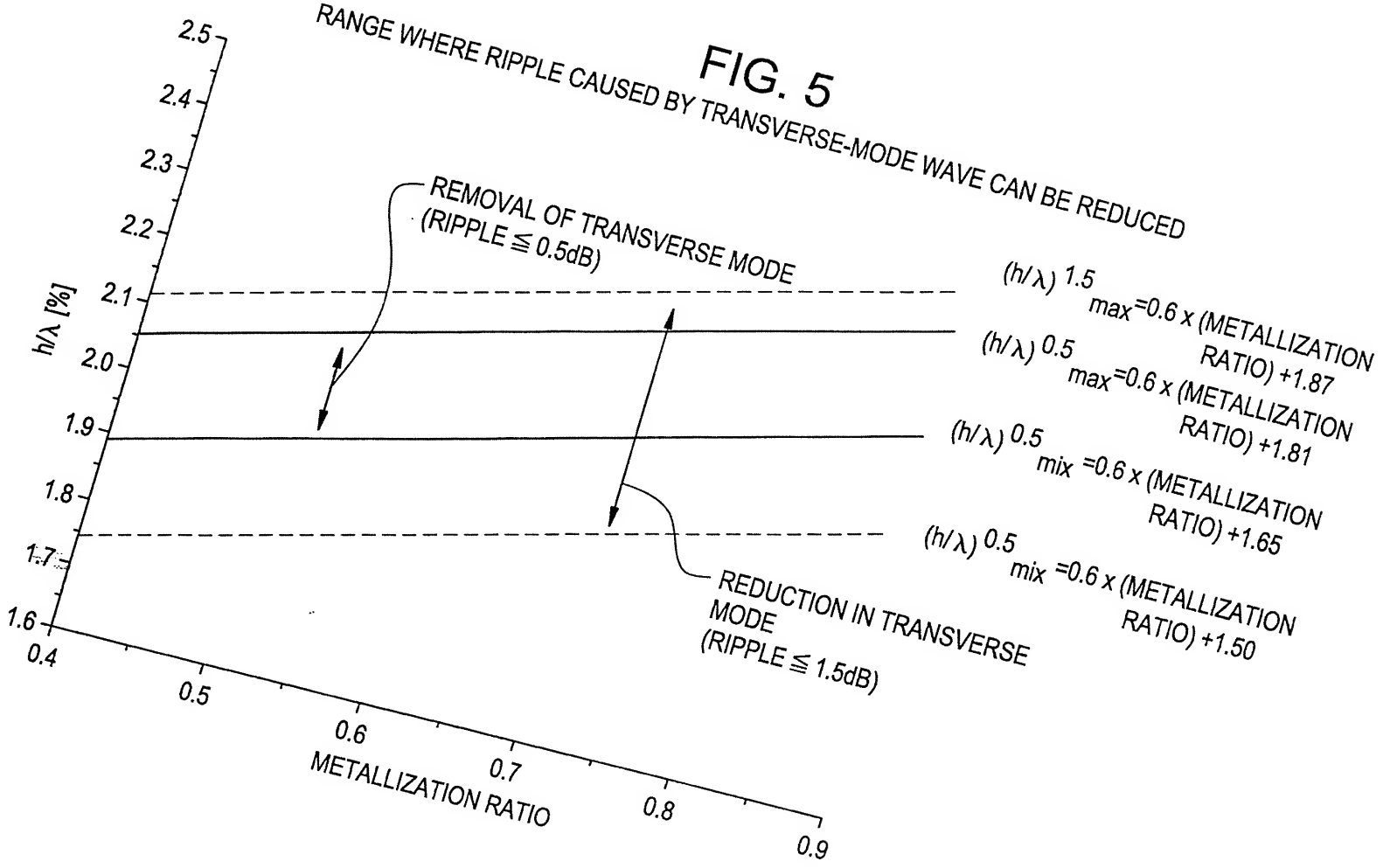

RANGE WHERE RIPPLE CAUSED BY TRANSVERSE-MODE WAVE CAN BE REDUCED
REMOVAL OF TRANSVERSE MODE
(RIPPLE ≦ 0.5dB)
(h/λ) 1.5
max=0.6 x (METALLIZATION RATIO) +1.87
(h/λ) 0.5
max=0.6 x (METALLIZATION RATIO) +1.81
(h/λ) 0.5
mix =0.6 x (METALLIZATION RATIO) +1.65
(h/λ) 0.5
mix =0.6 x (METALLIZATION RATIO) +1.50
REDUCTION IN TRANSVERSE MODE
(RIPPLE ≦ 1.5dB)
h/λ [%]
2.5
2.4
2.3
2.2
2.1
2.0
1.9
1.8
1.7
1.6
0.4
0.5
0.6
0.7
0.8
0.9
METALLIZATION RATIO

FIG. 6A

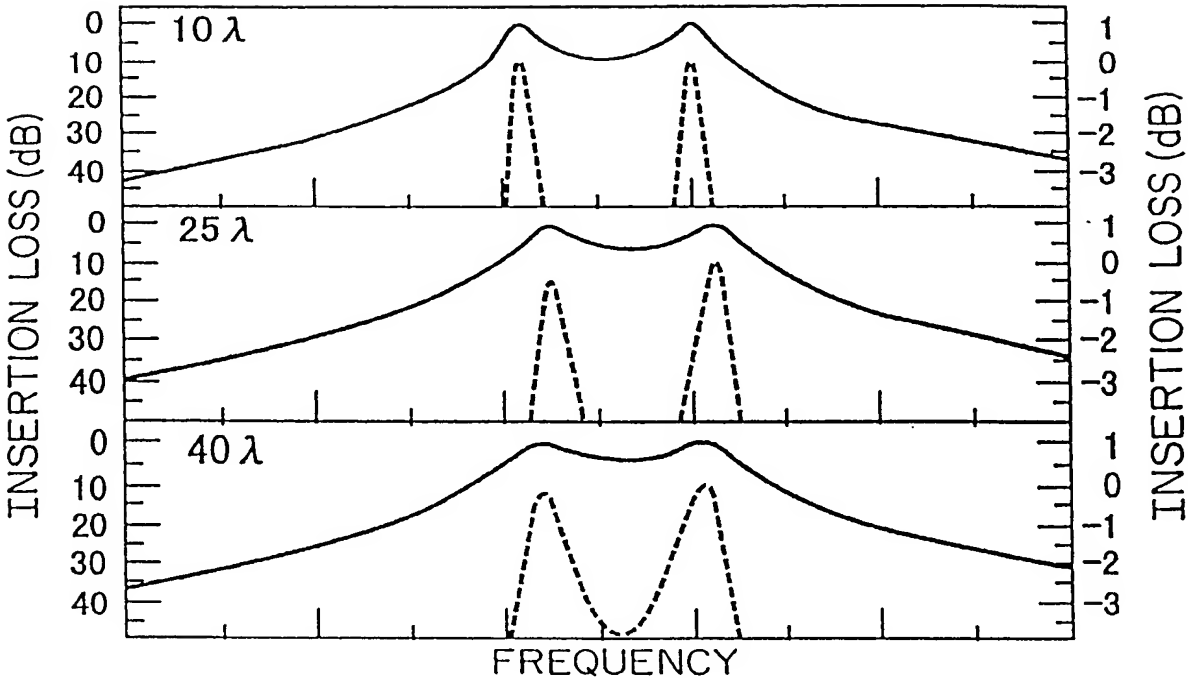

10 λ
25 λ
40 λ
INSERTION LOSS (dB)
0
10
20
30
40
1
0
−1
−2
−3
FREQUENCY

FIG. 6B

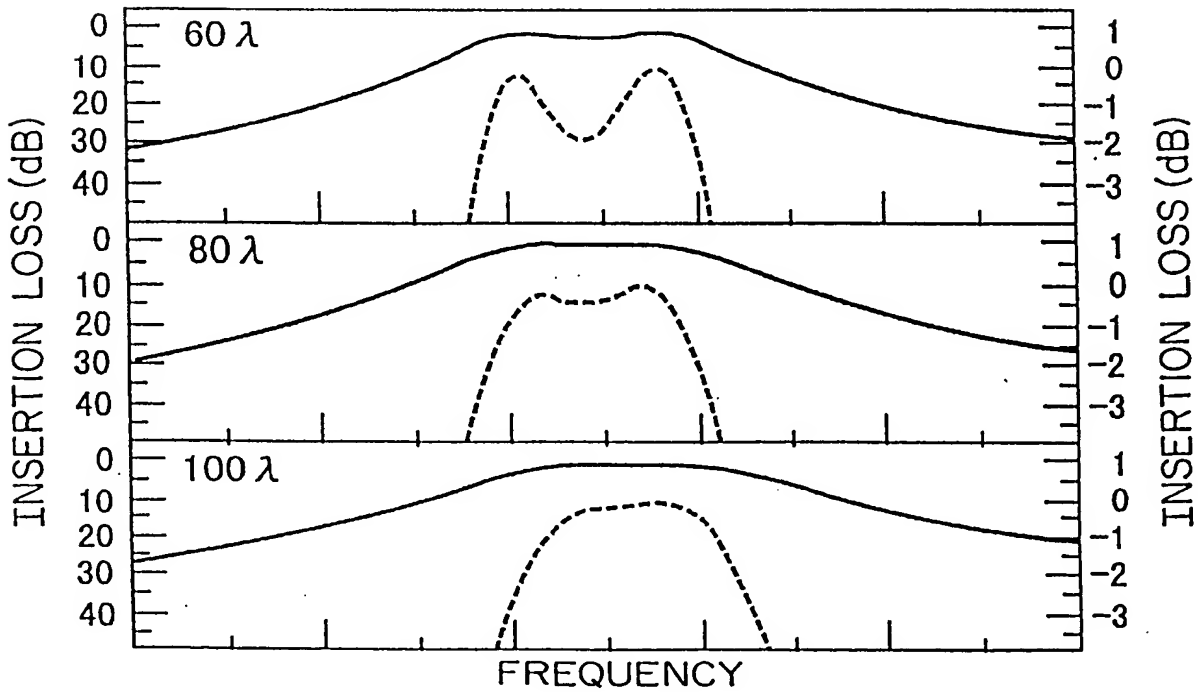

60 λ
80 λ
100 λ
INSERTION LOSS (dB)
0
10
20
30
40
1
0
−1
−2
−3
FREQUENCY

FIG. 7

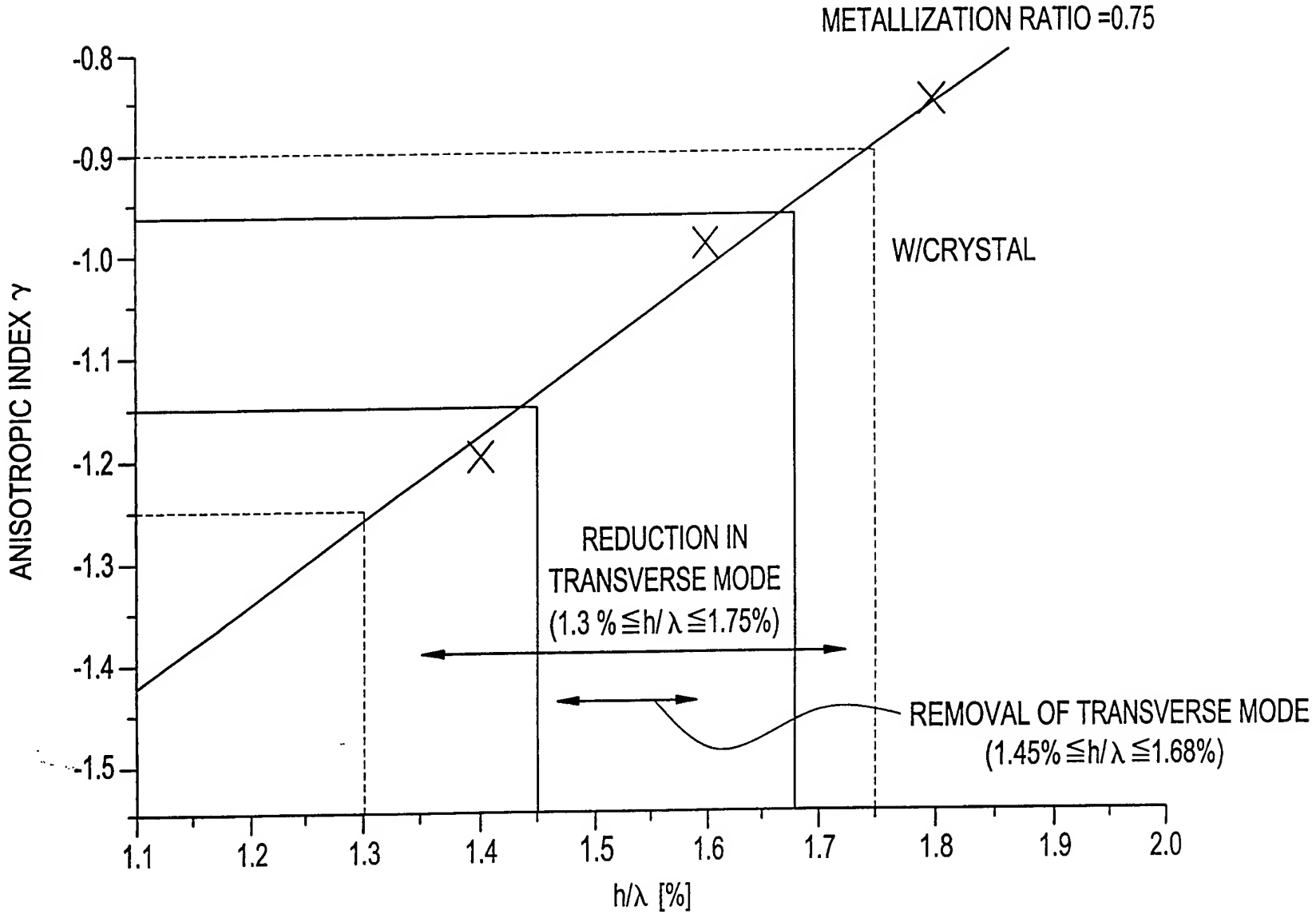

METALLIZATION RATIO =0.75
-0.8
-0.9
-1.0
-1.1
-1.2
-1.3
-1.4
-1.5
ANISOTROPIC INDEX γ
W/CRYSTAL
REDUCTION IN
TRANSVERSE MODE
(1.3 %≦h/λ≦1.75%)
REMOVAL OF TRANSVERSE MODE
(1.45%≦h/λ≦1.68%)
1.1
1.2
1.3
1.4
1.5
1.6
1.7
1.8
1.9
2.0
h/λ [%]

FIG. 8

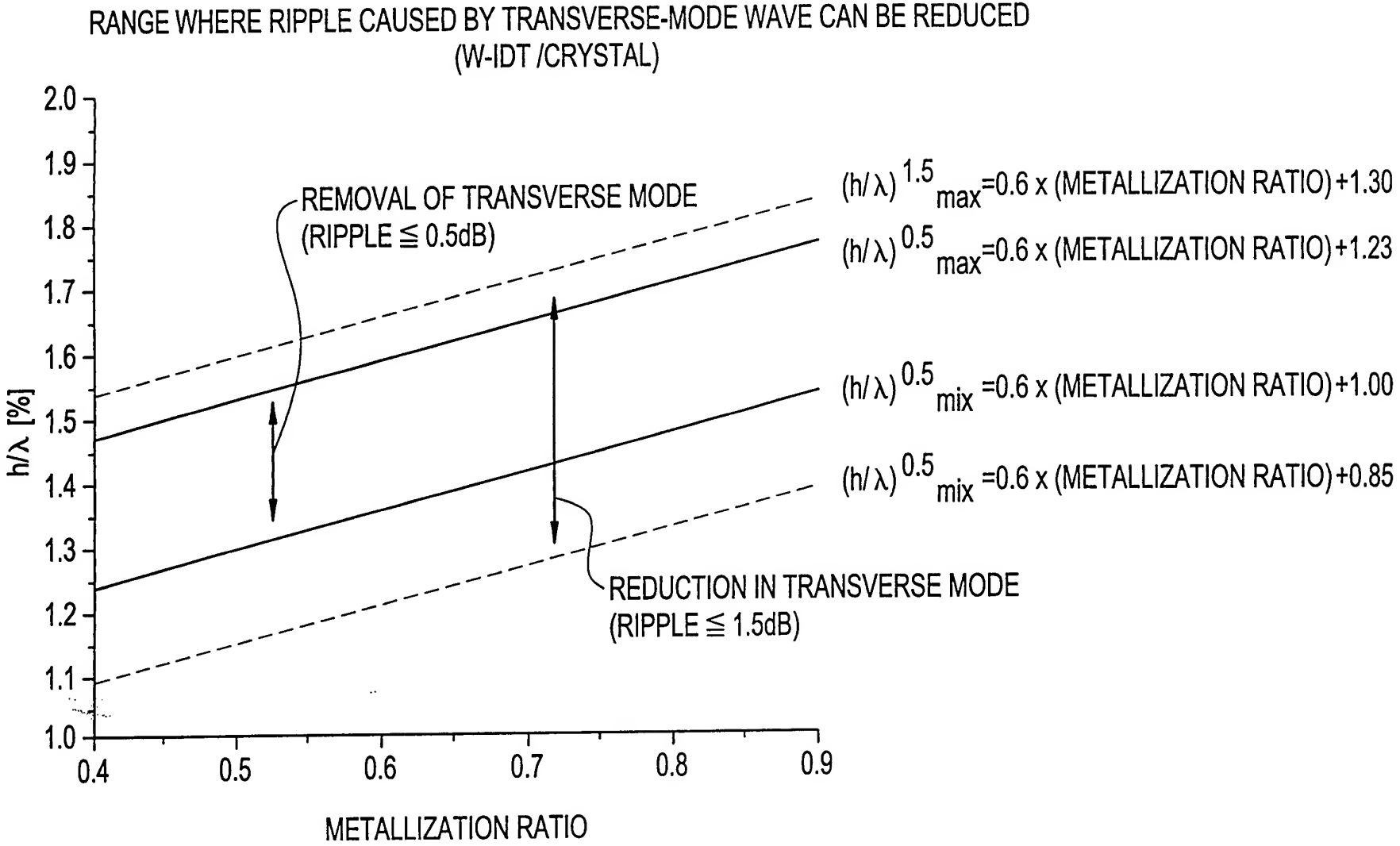

RANGE WHERE RIPPLE CAUSED BY TRANSVERSE-MODE WAVE CAN BE REDUCED
(W-IDT /CRYSTAL)
h/λ [%]
2.0
1.9
1.8
1.7
1.6
1.5
1.4
1.3
1.2
1.1
1.0
0.4
0.5
0.6
0.7
0.8
0.9
METALLIZATION RATIO
REMOVAL OF TRANSVERSE MODE
(RIPPLE ≦ 0.5dB)
REDUCTION IN TRANSVERSE MODE
(RIPPLE ≦ 1.5dB)
(h/λ) 1.5 max =0.6 x (METALLIZATION RATIO) +1.30
(h/λ) 0.5 max =0.6 x (METALLIZATION RATIO) +1.23
(h/λ) 0.5 mix =0.6 x (METALLIZATION RATIO) +1.00
(h/λ) 0.5 mix =0.6 x (METALLIZATION RATIO) +0.85

FIG. 9

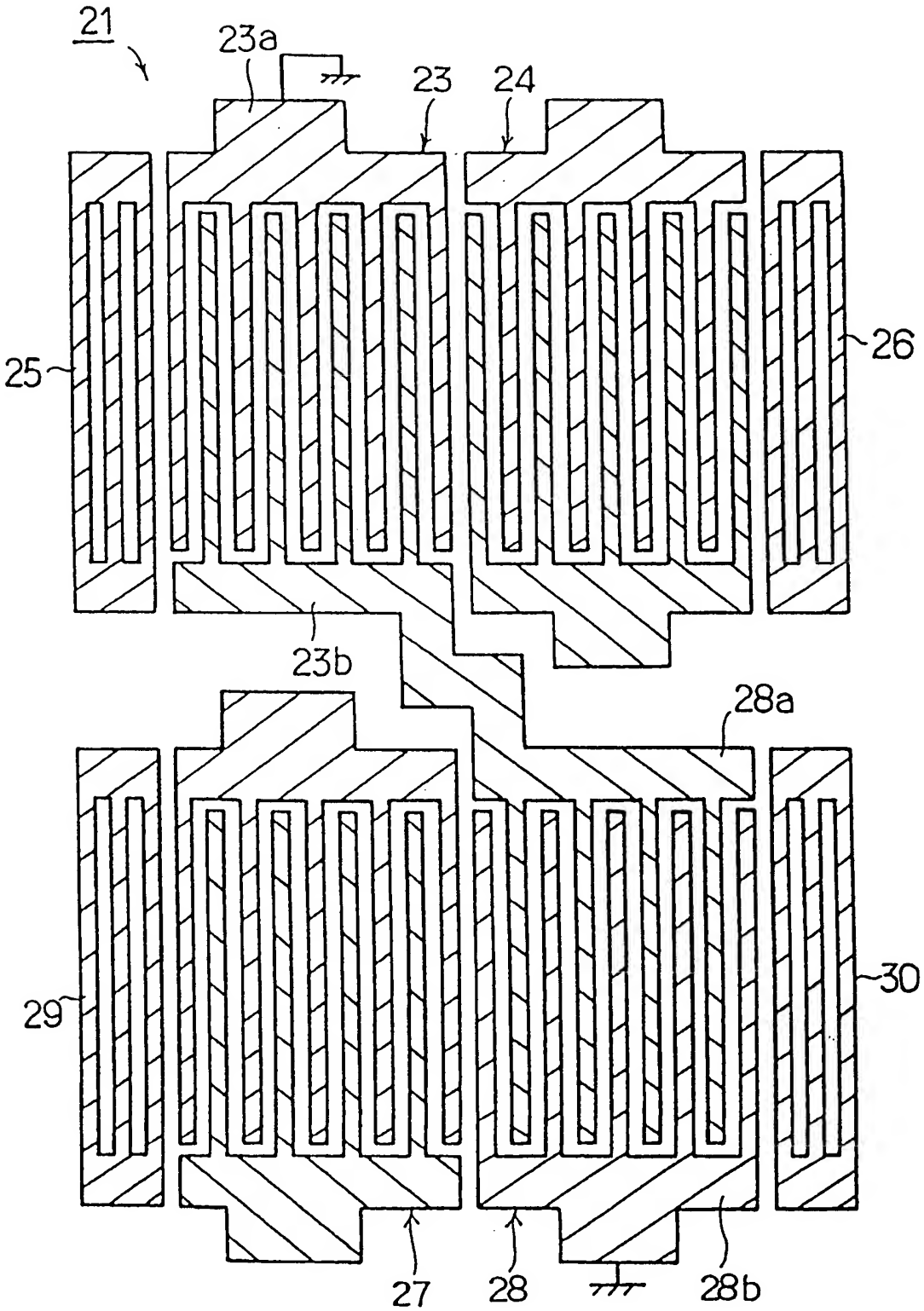


FIG. 10

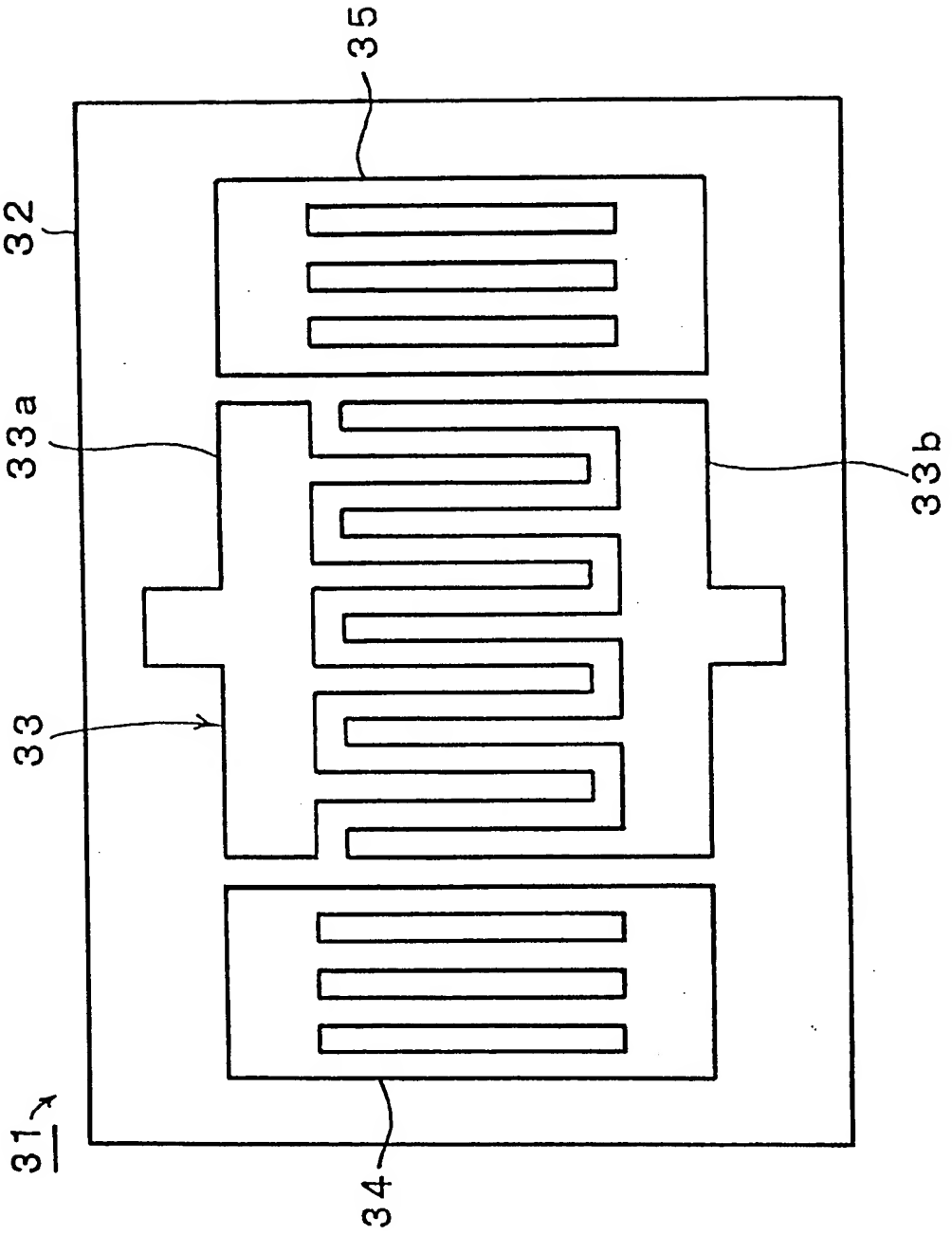


FIG. 11

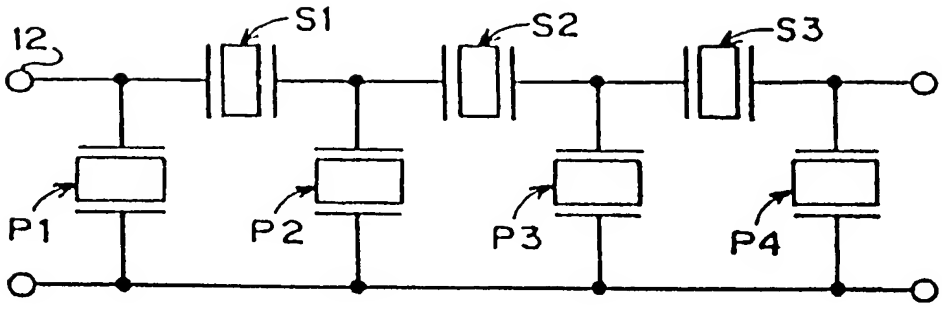


FIG. 12

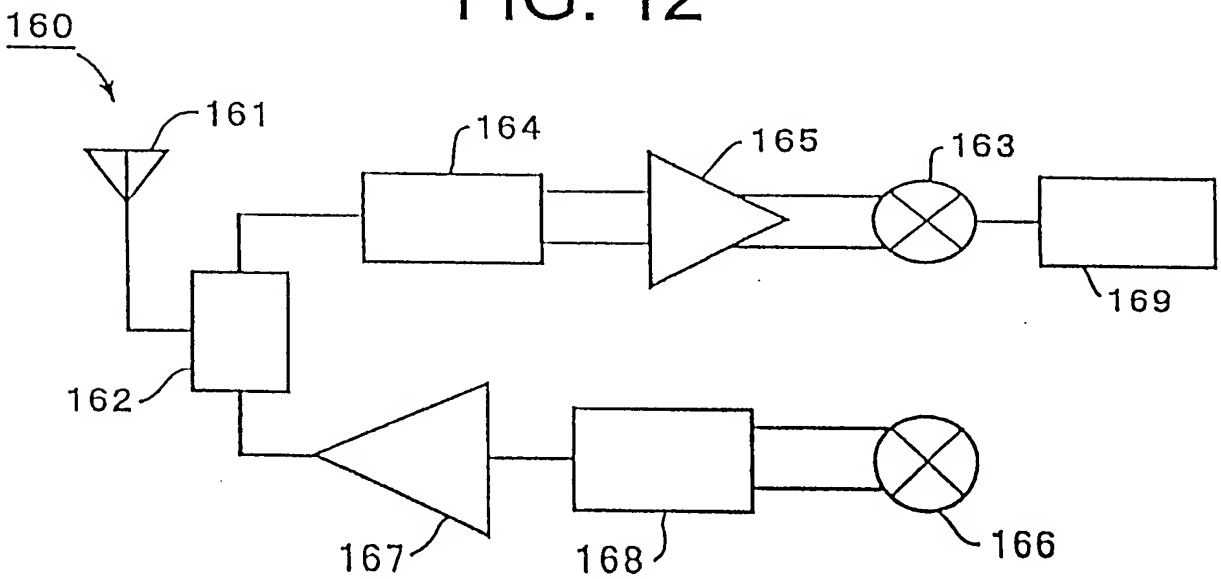
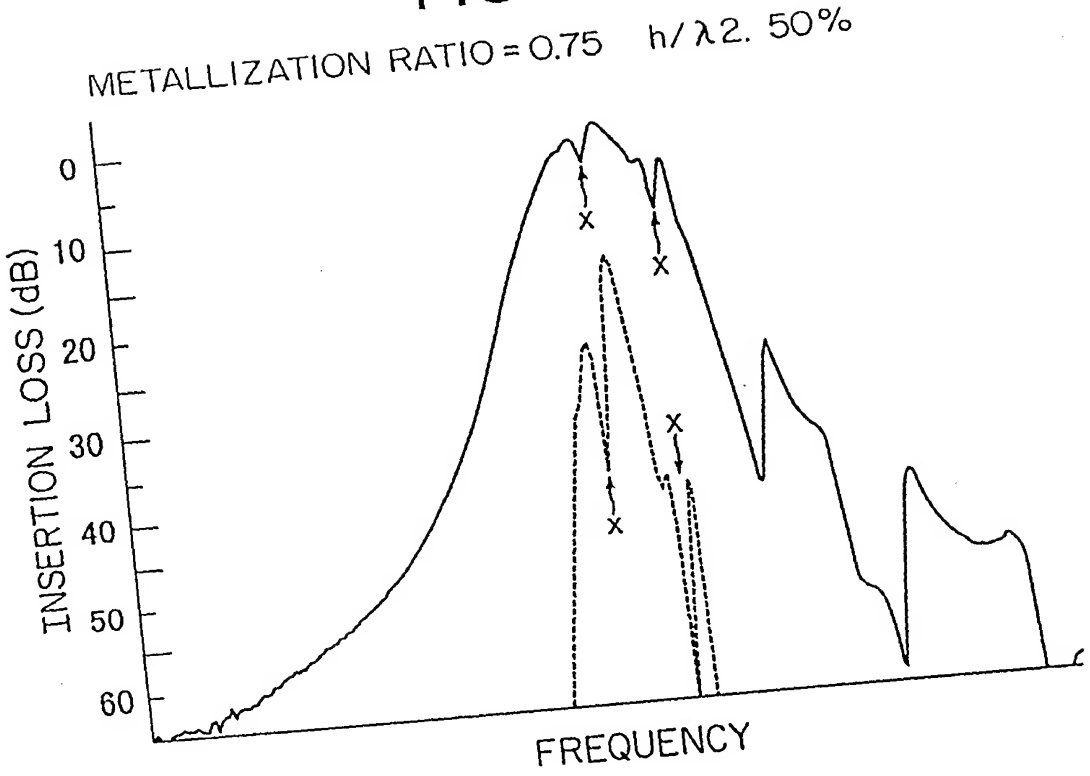


FIG. 13


METALLIZATION RATIO = 0.75 h/λ 2. 50%
INSERTION LOSS (dB)
0
10
20
30
40
50
60
FREQUENCY